

30. (Twice Amended) A method of planarizing a substrate surface containing a copper or copper alloy layer disposed on a barrier layer comprising:

(a) polishing the substrate surface on a first platen with a first polishing composition to reduce a copper or copper alloy layer at a first removal rate, wherein the first polishing composition comprises:

- about 1 wt.% to about 10 wt.% of an oxidizer;
- about 0.05 wt.% to about 0.20 wt.% of an inhibitor;
- about 1.0 wt.% to about 5.0 wt.% of a first chelating agent;
- about 3.0 wt.% to about 15.0 wt.% of a second chelating agent;
- and deionized water; and

(b) polishing the substrate on a second platen with a second polishing composition to remove the copper or copper alloy layer at a second removal rate less than the first removal rate.

31. The method according to claim 30, further comprising removing the barrier layer on a third platen.

32. The method according to claim 30, wherein the first removal rate is greater than about 5,000 Å per minute and the second removal rate is between about 1000 Å per minute and about 3,000 Å per minute.

33. The method according to claim 31, wherein the barrier layer comprises tantalum (Ta) or tantalum nitride (TaN) and is disposed on a dielectric material.

34. The method according to claim 30, wherein polishing at the second removal rate is performed at a removal rate ratio of copper layer to barrier layer of greater than about 100:1.

35. The method according to claim 34, wherein polishing at the second removal rate is performed under conditions such that dishing within the dense array is about 300 Å or less.

36. The method according to claim 35, wherein the first platen and the second platen each comprise a polishing pad mounted on a rotating, stationary, or linear platen.

37. The method according to claim 36, wherein the first and second platens are rotated during polishing at less than about 60 rpm or first and second belts disposed on the first and second platens are moved linearly at a rate of less than about 30 inches per second.

38. The method according to claim 36, further comprising cleaning the polishing pads by removing debris and polishing by-products.

C2 39. (Amended) The method according to claim 30, further comprising recycling the first polishing composition, the second polishing composition, or both.

40. (Amended) The method according to claim 36, wherein the first polishing composition is delivered to the first platen at a flow rate of about 300 milliliters per minute or greater and the second polishing composition is delivered to the second platen at a flow rate of about 300 milliliters per minute or greater.

41. (Amended) The method according to claim 36, wherein the static removal rate of the copper or copper alloy by the first polishing composition and the second polishing composition is about 150 Å per minute or less.

42. The method according to claim 30, further comprising exposing a polishing pad disposed on the first platen or the substrate surface to an inhibitor after polishing at the first removal rate and prior to polishing at the second removal rate.

43. The method according to claim 42, further comprising exposing a polishing pad disposed on the second platen or the substrate surface to an inhibitor after polishing at the second removal rate and prior to removing the barrier layer.

C3 44. (Amended) The method according to claim 36, further comprising:
exposing the first polishing pad or the substrate surface to an inhibitor after polishing at the first removal rate and prior to polishing at the second removal rate;
exposing the second polishing pad or the substrate surface to an inhibitor after polishing at the second removal rate; and
recycling the first polishing composition, the second polishing composition, or both.

C4 59. (Twice Amended) A method of planarizing a wafer surface, comprising:

removing a portion of a copper containing material with a first polishing composition at a first removal rate, wherein the first polishing composition comprises about 0.05 wt.% to about 0.2 wt.% of an inhibitor; and

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cat selectively removing a copper containing material with a second polishing composition at a second removal rate less than the first removal rate, wherein the second polishing composition comprises about 0.5 wt.% to about 1.0 wt.% of an inhibitor.

60. The method of claim 30, wherein the method steps for processing a substrate surface comprise a series of instructions disposed in comprise a computer-readable medium adapted to implement instructions for planarizing the wafer surface by a chemical mechanical (CMP) system when said instructions are arranged and executed by one or more processors connected to the chemical mechanical (CMP) system.

61. (Amended) The method of claim 30, wherein the first polishing composition comprises an abrasive-free polishing composition.

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62. (Amended) The method of claim 61, wherein the first polishing composition comprises:

about 6 wt.% of hydrogen peroxide;
about 0.15 wt.% of 5-methyl benzotriazole;
about 3 wt.% of iminodiaetic acid;
about 9.0 wt.% of ammonium hydrogen phosphate; and
deionized water.

63. (Amended) A method of planarizing a substrate surface containing a copper or copper alloy layer disposed on a barrier layer comprising:

(a) polishing the substrate surface on a first platen with a first polishing composition to reduce a copper or copper alloy layer at a first removal rate; and

(b) polishing the substrate on a second platen with a second polishing composition to remove the copper or copper alloy layer at a second removal rate less than the first removal rate, wherein the second polishing composition comprises:

about 0.05 wt.% to about 6.0 wt.% of an oxidizer;

about 0.03 wt.% to about 0.15 wt.% of an inhibitor;
about 0.5 wt.% to about 2.0 wt.% of a first chelating agent;
about 1.0 wt.% to about 6 wt.% of a second chelating agent; and
deionized water.

64. (Amended) The method of claim 63, wherein the second polishing composition is an abrasive-free polishing composition comprising:

about 3 wt.% of hydrogen peroxide;
about 0.06 wt.% of 5-methyl-benzotriazole;
about 1.0 wt.% of iminodiacetic acid;
about 3 wt.% of ammonium hydrogen phosphate; and
deionized water.

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65. The method of claim 30, wherein polishing the substrate on the first platen is performed at a first polishing pressure and polishing the substrate on the second platen is performed at a second polishing pressure less than the first polishing pressure.

66. The method of claim 65, wherein the first polishing pressure is about 3 psi or greater.

67. The method of claim 65, wherein the second polishing pressure of less than about 3 psi.

68. The method of claim 65, wherein the first polishing pressure is 3 psi and the second polishing pressure is 2 psi.

69. The method of claim 36, wherein the first polishing pad and the second polishing pad are maintained at a temperature of about 50°C or less during polishing the substrate surface.

70. (Amended) The method of claim 30, wherein the first abrasive free polishing composition comprises a corrosion inhibitor concentration between about 0.05 wt.% and about 0.20 wt.% and the second fixed abrasive polishing composition has a corrosion inhibitor concentration between about 0.5 wt.% and about 1.0 wt.%

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